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We have

$$P_4 = -2^3.83, \quad p_4 = -2.3,$$

and 6 is a superior limit to the roots. Hence

$$\xi = \pm 1, \pm 2, \pm 4, \pm 8; \quad \eta = \pm 1, \pm 2, \pm 3, \pm 6.$$

But $\xi_1 + \xi_2 = 6$, hence the pair (ξ_1, ξ_2) is either $(-2, 8)$ or $(2, 4)$, *i. e.*, $\xi = 2$ or -2 . The maximum number of unsuccessful trials is 15. With $\xi = 2$, $\eta = 6$, we have, employing an obvious extension of synthetic division,

$$\begin{array}{r} 1 - 6 + 3 + 22 - 6 \mid 2 + 6 \\ \underline{1} \quad \underline{2} \quad \underline{6} \\ -4 - 8 - 24 \\ \underline{1} \quad \underline{2} \quad \underline{6} \\ 0 \quad 0 \end{array}$$

Thus the remainder $ax + b$ is zero and

$$f(x) = (x^2 - 2x - 6)(x^2 - 4x + 1).$$

Further illustrations of quartics with irrational roots follow.

Let

$$f(x) = x^4 - x^3 - 6x^2 + 5x + 3 = 0.$$

Then

$$P_4 = 2, \quad p_4 = 3; \quad \xi = \pm 1, \pm 2; \quad \eta = \pm 1, \pm 3.$$

The only pair (ξ_1, ξ_2) for which $\xi_1 + \xi_2 = 1$ is $(-1, 2)$. Hence the maximum number of unsuccessful trials is three. We find

$$f(x) = (x^2 + x - 3)(x^2 - 2x - 1).$$

Exercise 1.—Show that the equation

$$x^4 + 4x^3 - 4x^2 - 17x + 10 = 0$$

can be resolved by less than nine trial divisions, and that the roots are $\frac{1}{2}(-1 \pm \sqrt{21})$, $\frac{1}{2}(-3 \pm \sqrt{17})$.

Exercise 2.—Solve the equation

$$x^4 + 4x^3 + 4x^2 - 16x + 28 = 0.$$

NOTES AND NEWS.

SEND ALL COMMUNICATIONS TO D. A. ROTHROCK, Indiana University.

The Secretary of the ASSOCIATION, Professor W. D. CAIRNS, is on leave of absence from Oberlin College during the present academic year. Until further notice he will be in residence at the University of Chicago and his official address will be 5465 Greenwood Avenue, Chicago, Illinois.

At Dartmouth College, Dr. C. N. HASKINS has been promoted to be Professor of Mathematics on the Chandler Foundation.

Dr. R. W. BURGESS, formerly of Cornell University, has been appointed to an instructorship at Brown University.

Dr. NATHAN ALTSHILLER, who was last year at the University of Colorado, has become instructor in mathematics at the University of Oklahoma.

Dr. A. A. BENNETT, formerly instructor at Princeton University, has been appointed adjunct professor of mathematics at the University of Texas.

Mr. F. E. WOOD and Mr. GLEASON, graduate students at Princeton University, have been appointed to instructorships at Northwestern University.

Mr. F. L. Smith, formerly instructor at Northwestern University, is now instructor in mathematics at Princeton University.

Dr. R. E. Gilman, formerly instructor at Princeton University, has been appointed to an instructorship at Cornell University.

Mr. C. M. Reynolds, Jr., has been appointed to an instructorship in mathematics at Wesleyan University, Middletown, Conn.

Mr. Carl A. GARABEDIAN goes to New Hampshire State College for the coming year as instructor in mathematics.

Professor EVA S. MAGLOTT, for the past thirty-two years professor of mathematics in Ohio Northern University, died during the summer vacation.

Mr. L. L. LOCKE, of the Brooklyn Training School for Teachers, conducted classes in the history and pedagogy of mathematics at the summer session of Grove City (Pa.) College.

Mr. H. W. MYERS, who has recently taken the master's degree at the University of Chicago, has been elected to the professorship of mathematics at Huron College, Huron, South Dakota.

Dr. A. M. HARDING has returned to the University of Arkansas as professor of mathematics and university examiner after a year's leave of absence spent in study at the University of Chicago, where he received the doctorate in June, 1916.

At the University of Nebraska, Mr. A. H. GIST has been transferred from the department of mathematics to that of physics and Dr. ELIZABETH B. GRENNAN has resigned. Mr. Albert BABBITT and Miss MARY COLPITTS have been appointed to instructorships in mathematics.

Dr. J. C. DUNCAN, instructor at Harvard University, has been appointed professor of astronomy and director of the Whitin Observatory at Wellesley College.

On account of the war, many of the European periodicals are weeks and even months late in arriving in this country. It is reported that *L'Education Mathématique* and *Revue de Mathématiques Spéciales* have suspended publication.

At the University of Kansas, Dr. SOLOMON LEFSCHETZ and Mr. J. J. WHEELER, instructors in mathematics, have been promoted to assistant professorships, and Mr. E. B. MILLER has been appointed instructor in mathematics for the year 1916-17.

Dr. JOHN P. D. JOHN, former president of De Pauw University, Greencastle, Ind., died on August 7, at the age of seventy-three. Dr. John served as professor of mathematics at De Pauw from 1882 to 1889, when he became president. He served as president from 1889 to 1895, resigning to go upon the lecture platform.

Dr. K. P. WILLIAMS, assistant professor of mathematics at Indiana University, served as first lieutenant in the first regiment of Indiana troops now stationed on the Mexican border at Llano Grande, Texas. It was ordered, however, that troops constituting college units should be mustered out of service on September 1, that the men might continue their college work.

The Mathematical Gazette, May, 1916, contains an interesting article by Professor H. S. CARSLAW on "A progressive income-tax," a scheme of taxation introduced in Australia. Schedules are deduced for "Rate of tax upon income derived from personal exertion," and "Rate upon income derived from property." The same number of the *Gazette* also contains a paper by E. H. NEVILLE on the "So-called cases of failure in the solution of linear differential equations."

According to cable reports from London, the Council of Trinity College, Cambridge, has removed Professor BERTRAND RUSSELL from his lectureship in logic and principles of mathematics on account of his having been convicted under the defense of the realm act for publishing a leaflet defending the "Conscientious Objector" to service in the British army. Professor Russell is well known in this country through his mathematical writings.

The *Annals of Mathematics*, June, 1916, contains the following: "On the wronskian test for linear dependence," by M. BÔCHER; "Note on a theorem of envelopes," by W. R. LONGLEY; "Non-essential singularities of functions of several variables," by D. JACKSON; "A congruence of circles," by F. W. BEAL; "A case of iteration in several variables," by A. A. BENNETT; "The arithmetic genus of an algebraic manifold immersed in another," by S. LEFSCHETZ; "A characteristic property of self-projective curves," by L. L. DINES.

Professor E. D. GRANT, of the Michigan College of Mines, Houghton, Mich., was given the degree of Ph.D. in mathematics at the September Convocation of the University of Chicago. Others receiving the doctorate in mathematics at this time were Mr. ARCHIE S. MERRILL, who goes to the University of Montana as assistant professor, and Miss GILLIE LAREW, who returns to her post as professor of mathematics in Randolph-Macon Woman's College.

Hunter College for Women, New York City, maintains a lively Mathematical Club, to membership in which all students specializing in mathematics are eligible. The club has for its aim the study and investigation of mathematical subjects which are crowded out of the ordinary curriculum. Reports are given once a month on such topics as: "Non-Euclidean geometry," "Geometry of motion," "Hyperspace," "The golden age of mathematics," "The nature of mathematics," "Zero," "Early surveying instruments," "The earliest mathematicians," etc. Meetings are held once a month, and a small membership fee is charged.

The attention of members is called to a proposed agreement between the Association and the *Annals of Mathematics*, to be found elsewhere in this issue among the actions of the Council. This agreement will not go into effect unless it is finally ratified by the Council after the views of the members have been secured. Comments should be mailed to the Secretary at an early date. (His present address is 5465 Greenwood Avenue, Chicago, Ill.)

Articles of an expository nature have appeared from time to time in the *Annals*, many of which have been of real importance and of great value to mathematics in this country. It is felt that a greater opportunity for publication of articles of this type is much needed, and that the encouragement of such work is a proper function of the Association. The further opportunity to assist in the promotion of such a worthy project seems very attractive to many of those who have given it consideration.

The advantage secured to the members of the Association whereby the enlarged *Annals* may be obtained at a price actually less than the present price will certainly commend itself to all, and it is hoped that, if the arrangement is finally consummated, many members will avail themselves of this opportunity.

The plan mentioned above will in no wise interfere with the present policy of the MONTHLY. The papers which properly appear in the MONTHLY are necessarily brief, since a variety of articles of different types is needed. In fact, the pressure upon the MONTHLY by the large number of good articles of this sort and by the numerous other necessary features well illustrated in the present issue, has already caused the expansion of the MONTHLY by at least twenty per cent. in the current volume, and still further enlargement will be required in the near future.

The attendance at the first summer meeting of the Association was most gratifying, especially in view of the fact that the threatened strike on the rail-

roads came just at the time when those at a distance were preparing to start. Many were thus deterred from going who had definitely planned to be present. Nevertheless, the 111 members in attendance were widely distributed and represented all parts of the country in about the proportion that might be expected; namely 48 from New England, 27 from the Middle States, 27 from the Middle West, five from the South, and three from the far West.

The twenty-third summer meeting and eighth colloquium of the American Mathematical Society were held at Harvard University during the week of September 4-9, 1916. About ninety-eight members were in attendance and over forty papers were presented. The freshman dormitories of Harvard University were opened for the accommodation of the members, and in this way all were thrown together in social intercourse far more effectively than would have been the case if they had been scattered about in the Boston hotels.

Eighty-four persons attended the dinner on Monday evening, where the after-dinner addresses were devoted chiefly to the early history of the Society, it being the twenty-fifth anniversary of its organization as a national body. Professor THOMAS S. FISKE, who was the moving spirit in organizing the New York Mathematical Society in 1888, was also chiefly instrumental in the movement for expanding this local body into the American Mathematical Society in 1891, though this name was not actually taken until 1894. Professor Fiske, being the member of longest standing present at this meeting, was appropriately selected to speak on the early history of the Society, and he gave many interesting items of a personal character, including the reading of letters written to him as Secretary by Professors A. R. FORSYTH, ARTHUR CAYLEY, and J. W. L. GLAISHER, of Cambridge, England, and by Professors SIMON NEWCOMB, HENRY B. FINE, WOOLSEY JOHNSON, and DR. EMORY MCCLINTOCK, of this country. Professors Johnson and Fine were also present and gave personal reminiscences in response to the call of the toastmaster. It was made clear that the founding of the *Bulletin*, and later of the *Transactions*, had been the two great steps taken by the Society in establishing its place in the mathematical world as a producer of research of a high character. Other speakers were Professor G. D. BIRKHOFF, who acknowledged the great indebtedness to the older men who have made possible the present high standards of the Society and spoke of the great responsibility resting upon the younger men for maintaining and advancing these standards; Professor F. N. COLE, who praised the constitution and harmonious working of the Society and the devotion and willing service of its officers past and present; Professor A. G. WEBSTER, who is one of the Society's representatives on the United States Naval Board; Professor J. L. COOLIDGE, who extolled the ideals of the mathematicians; and Professor E. R. HEDRICK, who spoke of the relations of the Society to its younger sister, the Mathematical Association of America, and pledged the support of the new Association in every good work within its field for the advancement of the interests of mathematics in this country.

On Tuesday evening, Professor D. E. Smith entertained the members in an

informal gathering by reading an exceedingly interesting paper on "The History of Problems."

The colloquium lectures were delivered by Professor G. C. Evans of Rice Institute on "Topics from the Theory and Applications of Functionals, including Integral Equations"; and Professor Oswald Veblen of Princeton University on "Analysis Situs." Each gave five lectures, the two courses extending over the three days, September 6 to 8. This was the eighth colloquium which the Society has held, the last one before this having been at the University of Wisconsin two years ago. These courses of lectures are now published in book form by the Society, and thus a series of volumes quite unique in character in the research field is coming into existence.

This was unanimously regarded as the most successful summer meeting ever held by the Society, the attendance at both this meeting and that of the Association having undoubtedly been stimulated by the juxtaposition of the two.

On the second and third following pages are reprinted the Constitution and By-Laws of the MATHEMATICAL ASSOCIATION OF AMERICA, together with the list of officers and members of the Council for 1916. Special attention is called to Article III, Sections 1 and 2, of the Constitution and Section 2 of the By-Laws (concerning officers, tenure of office, and election of officers) by way of preparation for the first application of these regulations to be made about November first. The provision for nomination of officers through open primaries was intended to emphasize the opportunity presented to every member for active participation in the affairs of the Association.

Further attention is called to Article III, Section 3, of the Constitution which deals with the method of transacting the official business of the Association. While the Council, as a representative body, is vested with full authority in all matters, yet it may not "make or alter any question of policy" without first giving all members of the ASSOCIATION ample opportunity for the expression of opinion for or against such proposed action. The first opportunity for individual participation under this provision of the Constitution is now offered in connection with the proposed agreement with the *Annals of Mathematics* explained on page 288 of this issue.